

ASTRONOMY

Winter Skies

Nine Bright Stars Shine in the Heavens on December Evenings; Two Planets Are Also Now Visible

By JAMES STOKLEY

THE EVENING skies of the next month or two are the most brilliant of the year, for nine first magnitude stars shine overhead. And this year the December skies are still further brightened by two planets, which add to the gorgeous display freely available for all every clear night. The accompanying maps show the principal objects that are on view. They show the appearance of the northern and southern skies at 10:00 p. m. on December 1, 9:00 p. m. on the 15th and 8:00 p. m. on the 31st.

Perhaps the southeast is the best place to start your survey. Look first for three stars in a row, which form the belt of Orion the Warrior. Though not of the first magnitude they are easily located. Above them, to the left, is Betelgeuse; below, to the right, is Rigel, both first magnitude and part of the same constellation. Below Betelgeuse is the brightest star in the sky, Sirius, in Canis Major, the great dog. Above, and farther left, is Procyon, of Canis Minor, the lesser dog. Higher than Procyon, still farther to the left, is a pair of stars, Castor and Pollux, of Gemini, the twins. Pollux, the upper, is the brighter member of the pair.

High in the east is Auriga, the charioteer, with brilliant Capella. Next, to the right, is Taurus, the Bull, with a v-shaped group, the Hyades, to form the animal's head. In this group is bright and ruddy Aldebaran. Above is a little cluster of stars, the Pleiades, often called the "seven sisters." The remaining first magnitude stars are seen to the northwest. These are Vega, in Lyre, the lyre, which is near the horizon, and Deneb, of Cygnus, the swan.

Jupiter Brightest

All the objects mentioned thus far are stars, that is, distant suns, glowing globes of gas like our sun but millions of times farther away. The planets, however, are bodies like the earth, revolving around the sun, and shining by reflected sunlight. Jupiter is the brighter of the two December evening planets, and even exceeds Sirius, but it is in the constellation of Aquarius, to

the west, so there is no danger of confusing the two bodies. At the beginning of the month it remains visible nearly to midnight. The other planet, Saturn, is to the southwest, in Pisces, the fishes. Though considerably fainter than Jupiter, it is as bright as most of the prominent stars. Of the other naked eye planets, Mercury is too near the sun this month to be seen at all, while Mars and Venus, which is far the brighter, appear in the east shortly before sunrise.

Through a telescope, both Castor and Pollux are revealed as multiple stars. That is, they are not single globes, like the sun, but each consists of two or more stars, revolving around their common center. With even a small telescope, one with a three-inch lens, Castor may be seen to consist of two components. Observations made with a spectroscope show that each of these in turn consist of two, while nearby is a fifth star, also revolving with the others, and part of the same system. A moderate sized telescope shows that Pollux consists of three orbs, and there are at least three others shown in more powerful instruments.

Studied By Herschel

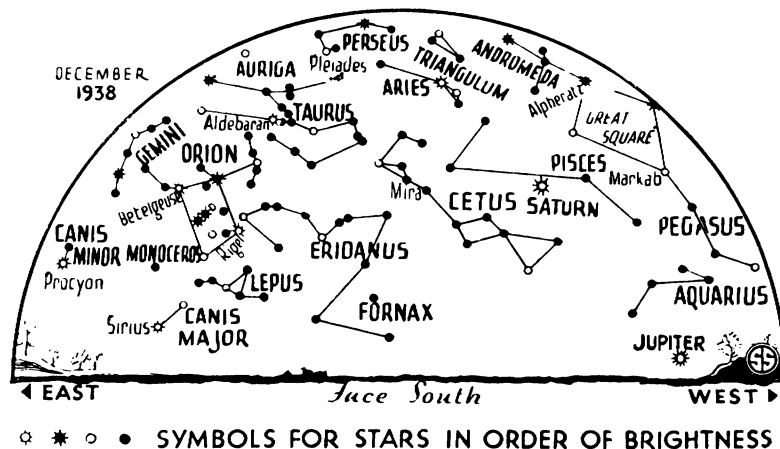
Such multiple stars are not rare, though it is not very usual to find so many components as in these. Probably at least a third of all the stars in the sky are multiple, and of these the binary stars, with two parts, are the most numerous. These were first studied in detail

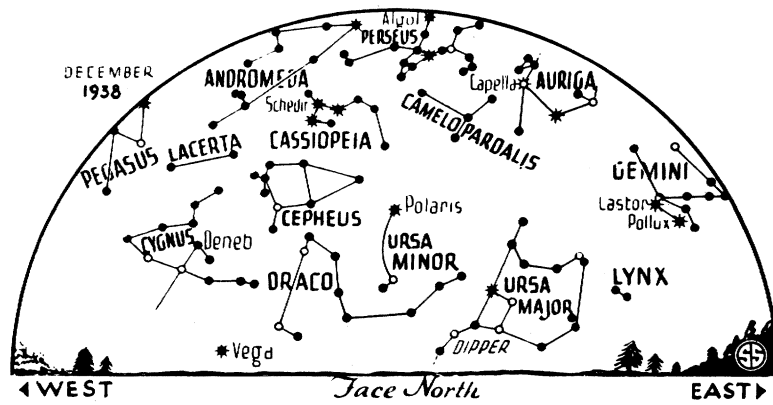
by the great English astronomer, Sir William Herschel, the bicentenary of whose birth we celebrated November 15. He was one of the greatest astronomers who ever lived, and certainly the greatest of amateur astronomers. It is a curious coincidence that the 200th anniversary of his birth is followed, in the next month, by the hundredth anniversary of the birth of one of the greatest of American astronomers, also an amateur, and one who was chiefly known for his work on binary stars, Sherburne Wesley Burnham.

Court Stenographer

Burnham was born in Vermont on December 12, 1838. By profession he was a court stenographer, and from 1892 to 1902 was clerk of the U. S. Circuit Court in Chicago. His first observations were made with a six-inch telescope of his own, and using it he discovered many binary stars that had not been known previously. His later researches were made with the 18-inch telescope of the Dearborn Observatory of Northwestern University, Evanston, Ill., then with the 36-inch of the Lick Observatory, Mt. Hamilton, Calif.; and finally with the 40-inch of the Yerkes Observatory, at Williams Bay, Wisconsin. This instrument is the largest refractor, or lens-equipped telescope, in the world, and is operated by the University of Chicago. With these facilities, he discovered some 1300 new binaries.

The bulk of his work was summarized in a large two-volume catalog of double stars in 1906. This gave all the recorded data up to that time of nearly 14,000 separate pairs, all that were known in





the part of the sky easily visible from Chicago.

He had retired from his court work in 1902, and in 1913 he retired from scientific work. Then his mantle fell on Dr. Eric Doolittle, of the University of Pennsylvania, who was given all his data. Burnham died on March 11, 1921. But Doolittle had died in 1919, and then the material was turned over to Dr. Robert G. Aitken, now director emeritus of the Lick Observatory, and living in Berkeley, California, where he is continuing the compilation of data. He published, as the joint work of himself and Dr. Doolittle, a new catalog of double stars in 1930, which is the latest authority. However, Dr. Aitken is maintaining a card file on all the recorded binaries, and is keeping it up to date, so there is much new material which has not yet been published. It is, however, made freely available to interested astronomers.

On December 22, at 7:14 a. m., the

sun, which has been moving southward since last June, reaches the end of its journey. This is the winter solstice and marks the beginning of winter. On this day the sun rises and sets farthest to the south, and reaches its lowest noon-day height of the year. For this reason, it is above the horizon for the shortest time, and the 22nd is thus the year's shortest day. In the southern hemisphere, however, conditions are reversed. There it is the longest day and the beginning of summer.

Phases of the Moon

	E. S. T.
Full	Dec. 7 5:22 a. m.
Perigee—Distance	
224,200 miles	Dec. 8 8:00 p. m.
Last quarter	Dec. 13 8:17 p. m.
New Moon	Dec. 21 1:07 p. m.
Apogee—Distance	
252,400 miles	Dec. 24 2:00 p. m.
First quarter	Dec. 29 5:53 p. m.

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small animals that scientists believed this treatment was worth at least a trial on human cancerous growths.

"The success of the neutron ray in animal experimentation does not justify any conclusion that it will be necessarily more successful in treating human beings than X-rays," said Dr. John Lawrence, who, with Dr. Robert S. Stone, chief roentgenologist in the University's hospital in San Francisco, is directing the experiments. "It may be months or even years before any results are known and, until then, we can offer no additional hope to cancer sufferers."

Dr. Lawrence is the brother of Dr. E. O. Lawrence, noted physicist who developed the cyclotron and the neutron ray used on the cancer patients. The neutron rays are created by bombarding a target of a light metal, notably beryllium, with very energetic deuterons, which are the nuclei or ions of heavy hydrogen.

The rays produced by this method were found to have a sharply different effect on biological tissue cells than the X-ray, and it was this difference which led to the present clinical investigations.

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PSYCHOLOGY

Strife Created in America By Advancing False Theories

CHARGES that strife is being systematically created in the United States by pressure groups and their conflicting theories of social justice are made by Dr. Henry C. Link, of the Psychological Corporation, in a book, "The Rediscovery of Man" (Macmillan)

"Abstract ideas rather than personal passions, lines of thought rather than bread-lines are pushing this country toward violence," he said.

"Personal tragedy and defeat were once due to the individual's weakness or to physical circumstances beyond his control; today, with untold material advantages, even the most promising person is hamstrung by a formidable array of scientific and pseudo-scientific theories."

IQ tests, Dr. Link says, are a legitimate scientific device whose effectiveness has been curtailed by addition of a theory that undermines the confidence of parents, of children and even of the schools, in the possibility of training a mind. A defeatist attitude is adopted by persons who blame their failures on lack of aptitude, an "inferiority complex" or their glands.

The misconception of man as a mere victim of forces beyond his control has

MEDICINE

Cyclotron Is Now Used In Treatment of Human Cancer

HUMAN cancer sufferers are now being treated for the first time with neutron rays from the 85-ton, atom-smashing cyclotron of the University of California.

Announcement of this use of the cyclotron, which it is hoped will greatly advance the war against cancer, was made by Dr. Ludvig Hektoen, executive director of the National Advisory Cancer Council, adjunct of the U. S. Public Health Service, which has been in the forefront in supplying funds and

technical assistance for this newest assault on cancer.

Cancer sufferers throughout the nation are warned not to start for California in the hope of getting treated by the cyclotron. The treatments are purely experimental and no successful outcome can be promised. Only a small group of patients from the University of California's teaching hospital in San Francisco are being treated. The cyclotron's neutron rays have been so effective in treating cancerous growths on